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# D2.1: Criteria and guidelines for user recruitment and engagement process

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*Publication date:*
2021

*Document Version*
Publisher's PDF, also known as Version of record

Link to publication from Aalborg University

*Citation for published version (APA):*
Aggeli, A., Christensen, T. H., Boekelo, M., & Young, J. (2021). *D2.1: Criteria and guidelines for user recruitment and engagement process*.

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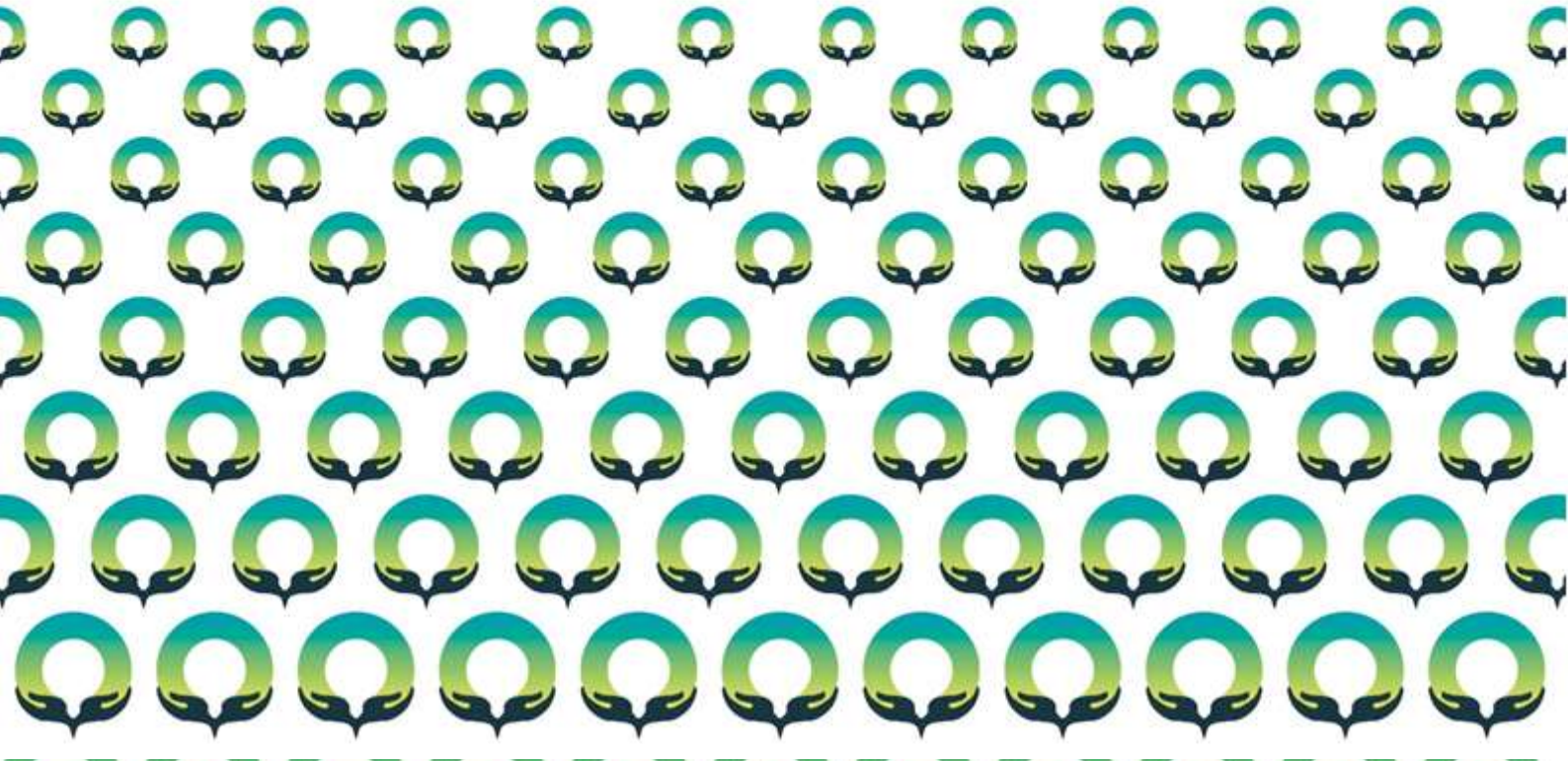
Hestia

# WP2: Participatory Design and Consumer Engagement Process

## DELIVERABLE REPORT

## D2.1: Criteria and guidelines for user recruitment and engagement process



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|---|---|
| Project Acronym | HESTIA |
| Project Title | Holistic dEmand response Services for European residenTIAl communities |
| Project Coordinator | Andrea Martinez<br>SINLOC<br>Andrea.martinez@sinloc.com |
| Project Duration | 01 November 2020 – 31 October 2023 |
| Deliverable No. | D 2.1 Criteria and guidelines for user recruitment and engagement |
| Dissemination level* | PU |
| Work Package | WP 2 – Participatory Design and Consumer Engagement process |
| Task | T 2.1: Guidelines for participatory design process and participant recruitment |
| Lead beneficiary | Aalborg University |
| Contributing beneficiary/ies | SNL, AXPO, EDF, ENE, ILECO, DW, 4YF, CPS, GRB |
| Due date of deliverable | 28 February 2021 |
| Actual submission date | 30 March 2021 |

Nature: R = Report, P = Prototype, D = Demonstrator, O = Other
Dissemination level PU = Public
PP = Restricted to other programme participants (including the Commission Services)
RE = Restricted to a group specified by the consortium (including the Commission Services)
CO = Confidential, only for members of the consortium (including the Commission Services

**DOCUMENT HISTORY**

| Version | Date | Authors | Description |
|---|---|---|---|
| 1 | 10 March 2021 | Aggeli, A., Christensen, T. H. Boekelo, M., Young, J. | 1st version for review |
| | 12 March 2021 | | Internal review provided by EDF |
| 2 | 15 March 2021 | Aggeli, A., Christensen, T. H. Boekelo, M., Young, J. | Final version |
| | 29 March 2021 | Andrea Martinez Roberta Bassan | Final quality check |

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**ACKNOWLEDGEMENT**

*This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No.* 957823

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# 1 Executive Summary

This report is the first deliverable of the prject 'Holistic dEmand response for European residenTIAl communities' (Hestia). It addresses the theoretical and practical considerations in regard to householder recruitment, engagement and participation, which are of central importance to Hestia.

The report includes 4 Chapters:

Chapter 1 is the executive summary of the document

Chapter 2 presents the general context of Hestia, introducing the three pilot sites and the overall objectives of WP2.

Chapter 3 outlines the theoretical and conceptual concepts used to investigate DR in households, as well as explain the priniciples behind the participatory methodology for the project.

Chapter 4 presents the recruitment and consumer engagement strategy.

The report uses a practice-theoretical perspective in order to explore and explain energy demand respond (DR) as a component of everday practices at home. Theories of practice direct the focus of household energy behaviour away from individual users, towards the understanding of more collective everyday consumption activities. Everyday energy-related practices are therefore considered as routinised behaviours, which involve a hybrid of people and materials (including technologies). This perspective is very useful for studying how households, for example, can co-ordinate their practices, or adopt some flexibility, in order to accommodate the dynamics of the smart grid.

Furthermore, the report suggests that in order to develop appropriate and meaningful technological interfaces for DR, it is important to understand the ways in which people domesticate technologies into their homes, which implies the different bonds and relationships they create between them. In order for technologies to be successfully domesticated, householders need to make sense of the meanings and dynamics of them in their home, along with their everyday committments and rhythms. The domestication perspective offers an alternative framework through which to investigate the sometimes weak longterm committment of households with household energy efficient technologies. Furthermore, it highlights the contribution of 'ordinary' or 'warm' experts, who are non-professional but familiar persons to the adopter of a technology. Warm experts act as mediators between the user and the technology and assist inexperienced or less experienced users to get more confident and proficient with digital systems and technologies.
Following this, principles of participatory design and co-creation are discussed as appropriate conceptual methodologies for composing a framework for the engagement of householders in the development of Hestia. The report argues that participatory processes can assist in the generation of collectively imagined scenarios for household DR, based on current everyday routines of the participating households. Furthermore, it suggests that connecting and co-locating the actors of a project gives them 'new insights and new competences', therefore encouraging mutual and social learning. In addition, by enabling the development of new networks between participants and local or national energy initiatives, there is a potential to sustain these newly developed collaborations into long-term relationships and partnerships.

Based on the above theoretical frameworks, the report composes a recruitment and engagement strategy. It initially observes and reflects on the current social conditions brought about by the COVID-19 pandemic, and suggests that there need to be new or revised research methods in order to accommodate the transformation of everyday life that we experience. In particular, it recommends the use of short, intense virtual interactions, as methods to assist and bridge traditional data collection methods, such as the survey and the participatory workshops.
The recruitment strategy highlights the importance of storytelling, as a technique to engage diverse social groups in the research. The use of learning stories, set in 'authentic cultural locations' and focused on the pursuit of meaning, can assist Hestia to develop narratives along the project for different purposes. These include stories to introduce people to the project, to help them embrace its objectives and to assist in the ownership of the vision that will be developed through the research with the active participation of citizens.

The report proposes that Hestia needs to recruit and maintain participants throughout the length of the project in order to develop good in-depth understandings of the energy practices of households. It is therefore crucial to identify and support a small but dedicated cohort of households from each pilot site, which will provide continuous

and relevant input to the planned Hestia activities, but also generate data through the Hestia home toolkits and their everyday living at home. Further to this, the report recommends the recruitment of pilot ambassadors, who will act as local representatives of the different socio-economic and cultural groups in each community. Their role will be to assist the public outreach and share good practice with other communities nationally and internationally, during and after the completion of Hestia. Hestia ambassadors will be particularly important for the generation and reinforcement of local energy communities in each pilot, acting as intermediaries between the households and the authorities or other energy actors.

The Hestia engagement strategy is designed as an iterative process including four stages: An online household survey, short virtual household interactions, participatory workshops and household interventions.
Between each stage, a preliminary analysis of the data collected will inform the next stage, and therefore assist the overall evaluation with insights along the way. This iterative process will allow for the customisation of the activities planned, to respond to householders' contributions. The report discusses the importance of the level of participation for each step, ranging from information to empowerment of householders, suggesting that it is important to facilitate an active participation of users, moving away from passive models of consultation toward the development of a collaborative decision making process.

Finally, the report highlights the role of communities and the role of gender in the process of exploring and co-creating household and community DR processes and interfaces. It suggests that community-oriented action and communication can prolong the users' engagement in a project and recommends that Hestia should be built on existing social networks and bonds in each pilot community. Additionally, it comments on the issue of uneven physical and cognitive housework in homes, and suggests that attention should be put in identifying whether the person(s) performing the daily household chores is the same at the one(s) engaging with the digital housekeeping. It is finally important to investigate gender roles and cognitive household labour in the current conditions of the pandemic, in which the boundaries between work and home are blurring.

# 2 Introduction

This deliverable *D2.1 Criteria and guidelines for user recruitment and engagement* is the outcome of task *T2.1 Guidelines for participatory design process and participant recruitment* of the Hestia project. The aim of the deliverable is two-fold. First, it develops recommendations on how to design inclusive demand response (DR) solutions that incorporate the practice requirements of the prospective users in the design process of the Hestia platform. By doing this, the goal is to ensure long-lasting and user-engaging technical solutions at the three pilot sites involved in the Hestia project. This part feeds into Hestia task T2.2 by defining the approach and activities of the inclusive and participatory DR solution design processes to be carried out in this task. Second, the deliverable develops a framework for the recruitment of participants in the specific pilots, taking into account differences between sites and between different groups of residents at each site. This also feeds into T2.2 as well as other Hestia activities related to recruiting participants for the Hestia trial.

In the remaining parts of this introductory chapter, we will present the overall scope of the Hestia project, including the Hestia's objectives in regard to consumer engagement and participation, and introduce the three pilot sites. This is followed by a presentation of the theoretical framework for the Hestia user engagement approach (Ch. 3), which forms the outset for developing the Hestia user recruitment and engagement strategy (Ch. 4).

## 2.1 Scope of Hestia

Hestia aims to provide a cost-effective solution for the next-generation of DR services which will leverage the consumer engagement, energy and non-energy services, while dealing with both energy supply and demand side in a holistic manner. Hestia intends to engage with residential consumers representing a still largely untapped sector, while enabling them to play an active role in flexibility sharing and grid balancing. Hestia will enable residential DR services through: (i) exploitation of energy demand flexibility by engaging the consumers in demand-side management activities, and (ii) valorisation of energy efficiency in multi-carrier energy dispatching and optimal operation of building systems. Hestia will exploit the consumer engagement as part of cooperative DR strategy at the community level, i.e. clusters of individual consumers and prosumers. To motivate the consumers to actively participate, Hestia will leverage the financial, environmental and social drivers, while cross-fertilizing them to maximize the impact. Hestia will involve the residents in the designing of the solutions through participatory co-design processes. Hestia will create community engagement methodology and organisational tools with a high acceptance, that can be replicated and provide the corresponding tailored toolsets for a broader rollout. Hestia will exploit the aggregated energy resource flexibility at the demand-side, in terms of cumulative energy consumption, distributed energy generation and storage, to better manage the disparity between energy demand, RES availability and grid requirements. User-personalized services will be delivered via a fully service-oriented, flexible ICT platform, underpinned by agent-based concepts, consumer digital twin and non-intrusive data analytics. Thus, Hestia will set the foundation for an open marketplace while steering consumer engagement according to the grid requirements and promoting RES and sustainable behaviour.

## 2.2 Hestia's objectives in regard to consumer engagement and participation

This deliverable was produced in the early stages of the Hestia project, and therefore should be considered as a guidance framework rather than a finished product, which will be continuously updated as the project moves along. User engagement and participation are of central importance to Hestia. The first scientific and technical objective (STO) of Hestia is to:

*Engage the end consumer to take an active part under the cooperative DR strategy. HESTIA will motivate and engage the residents and building occupants to manually influence the energy demand curve, participate in flexibility sharing and become an active part of underlying cooperative demand response program. (From the HESTIA Grant Agreement)*

Engagement of users in collaborative design processes of a product or service from their early stages has been found to enhance their value and acceptance from its audience (Fuentes 2019). Essentially, users become active co-creators of value, rather than passive consumers (ibid). This report, which is part of WP2, and the first deliverable of HESTIA, sets the basic guidelines for the recruitment and engagement of household users in the project.

By drawing on methods of collaborative design, and by aiming for recruiting a diversity of residents from each pilot site for these design processes, this deliverable contributes to the realization of the HESTIA goal of applying the

"Design for All" principles in the final design of the HESTIA solution. The Grant Agreement details the goal of a Design for All approach in the following way:

*HESTIA will follow the "Design for All" principles and guidelines with the aim that everyone, including future generations, regardless of age, gender, background, can benefit from the HESTIA development with equal opportunities. "Design for All" relies on the following simple principles (i) make the use of products and services easier for everyone; (ii) ensure that the needs, wishes and expectations of all potential users are considered in the design and evaluation processes of products or services.*

These two principles (i and ii) of Design for All are both in accordance with the principles of participatory and collaborative design methods that are methods aiming at incorporating the needs and wishes of prospective users in the design of new solutions. Also, the following guidelines on recruitment will emphasise the need for striving for a fair degree of diversity in relation to the recruitment of participants for the HESTIA design processes and trial, which complements the goal of HESTIA of supporting EU policies on gender diversity.

## 2.3 HESTIA pilot sites

There are three residential pilot sites selected for Hestia:

- The Berchidda municipality in Sardinia, Italy
- The Camille Claudel district in France and
- The Voorhoot district in The Netherlands

The pilots present opportunities for diverse demonstration opportunities for Hestia as they are set in different infrastructural, climatic, market and regulatory contexts. This will enable the application of different business models and levels of provided energy services. Furthermore, the pilots are important contexts for the particular socio-cultural characteristics that they display, which will enable a societal-aspects' analysis along different consumer categories (e.g. social category, age, technology literacy and gender).

### 2.3.1 The Berchidda municipality, Italy

Berchidda is located in the north of Sardinia and is a village with some 2700 inhabitants. It is at a mere 20 minutes away from the port and from the international airport of Olbia. Olbia is also the nearest urban pole that is reponsible for about 20% of traffic going in and out of the town. It's an agricultural town, with the vast majority of economic activity being related directly to livestock farming (sheep, mostly) or cultivaiton (wine, primarily). However, there is also a small forestry and crafts sector, the latter of which also feeds into (regional) tourism. There are a number of events that take place in the area that attract visitors, such as a jazz, reggae and a food festival.

Perhaps typical of many agricultural villages, the population is fairly old and practically educated. The average age is 48 and 25% is over 65. Only 5% have have a university education. Money doesn't flow abundantly: the current unemployment rate is at about 13% and almost 30% have an income below €10,000/annum. The island is currently being upgraded to ultra-wide band internet, but given the demographic, internet use is fairly low to begin with. Still, there is a local Facebook page through which residents communicate.

The houses are mostly family homes, with one to two floors. Only 12% has three floors or more. They are also fairly old, with half built before 1961 and only 7% since 1991. There are no smart home solutions, but there are 68 photovoltaic installations, 62 of which are owned by private individuals. The average household consumption profile is 2,436 kWh/year. The municipality is the owner of the electricity grid and is therefore an important relay point. Hestia analysis shows that with the recent transposition of REDII into law, Berchidda is ready to implement a demand response system and therefore further investigate, through Hestia whether it makes economic sense.

There are about 80 families who are eligible to participate in the Hestia pilot and at least 30 of them expected to be able to engage in the participatory process. There are several amenities that could serve as (safe) collaboration spaces. Thus, there are many sizeable, well-kept communal areas, gyms, a wine museum dedicated to cultural initiatives and the central square as an open space for community initiatives. The municipality and local association regularly hold meetings, so it should not be a problem to make 'first contact' and jumpstart the recruitment process. In addition, the mayor of Berchidda is very supportive of Hestia and would like to help introduce the project, possibly by a video.

### 2.3.2 The Camille Claudel district, France

The Camille Claudel district is located southwest of Paris in the city of Palaiseau. The climate is mild with an average temperature of 11°C and yearly temperatures fluctuating between monthly averages of 2 and 25°C. A bus line connects the district to the regional train station (Massy-Palaiseau), universities, schools and business centre.

The district was built in 2014 with the aim of offering an eco-responsible development, compatible with the objective of a sustainable energy transition. The 2000 dwellings were on average constructed in 2015. Most of the dwellings are appartments located in flat block buildings with a maximum of 3 to 4 storeys. The buildings have similar architectures, whether they are privately owned dwellings or belong to social landlords. The dwellings achieve a high level of energy performance and are labelled for the environmental and energy quality of their design. Heating is provided by a local heat network fed by wood and gas. There are 2 functional EV charging points and 63 thermal PV panels. Data on households' energy consumption profiles is readily available. The district has been awarded the Eco-District stage 3 label, which validates that all aspects of sustainable development are considered, from design to delivery.

There are 40 households estimated to be ready for partaking in the Hestia project. According to initial discussions, with the local municipality, the district is sought after and appreciated. The people living there can be described as a *cadre* population, meaning that they tend to enjoy a socio-economic status with relatively higher social benefits. Social and student housing are also part of the district. Contact to social renters can be made via the landlords. The population receives many requests from private operators and might be suspicious of novel projects such as Hestia. The support of the mayor of Palaiseau gives Hestia the necessary boost of credibility. The people in the district have a community website on Facebook. A community hall can be used for participatory engagement activities such as workshops.

### 2.3.3 The Voorhoot district, The Netherlands

The Voorhout district is a community of 46 new houses in the Voorhout village in the province of South Holland. The former municipality covered an area of 12.59 $km^2$ of which 0.33 $km_2$ is covered by water and had a population of 14,792 (in 2004). The first phase (29) houses were inhabited and operational as of autumn 2019. The pilot district is part of a larger new development tract, characterised by fairly spacious suburban living with artificial canals and ample green space. The district has been developed by the Van der Hulst construction company. In the Voorhout district these are the first homes they built that are (intended to be) net suppliers of energy.

Residents pay a low flat fee for – fair use of – their energy, which includes heating. PlusLeven, one of Hestia's pilot partner, intends to use the flexibility of various smart devices to trade on the variability of wholesale energy prices on the backend, enabling the flat fee subscription. This creates substantial complexity for the project as all these devices need to be able to respond to market fluctuations. So far, technical partners have not been able to pull this off as it has proven impossible to make all the devices talk to each other and with the market reliably. This has also resulted in some nuisance for the residents, as, for example, the heating systems have malfunctioned. PlusLeven is currently planning on offering market flexibility only through the batteries and slowly including other devices and systems subsequently.

All in all, PlusLeven and Van der Huls (which maintains after-sales services) report that while people are happy with their high-tech homes, living in them has required some getting used to (living with a new heating system, large devices like batteries in the home). Also, technical problems have created some annoyances and tensions. PlusLeven has drawn lessons from this about how to communicate differently and especially more frequently with the community about ongoing developments.

Speaking of the community, there are two retired residents with (semi) technical backgrounds who act as intermediaries of sorts between the residents and PlusLeven. There is also a local Facebook and chat group. On some blocks there are some offline neighbourly relations as well, but not on all. There are two kinds of homes built in the district: single family homes and senior-friendly, accessible homes. Since all of the residents have only started living in these homes a little over half a year before the Covid pandemic, they don't necessarily have a strong sense of 'normal' living and correspondingly not a distinct expectation of how life will be as lockdown and social distancing measures are slowly lifted.

Since it is a new neighbourhood that is solely residential, there aren't any regular local events in the neighbourhood. At the end of April, it's King's day though, in which there might be a spontaneous local fair. Speaking of fairs, on a fair weekend day, people will likely go for a stroll as it is a pleasant neighbourhood to walk through, so setting up an impromptu stand offering some coffee and a cake at the beginning of spring could also be a nice way of getting to know some of the residents.

## 2.4 Abbreviations and Acronyms

DR: Demand Response
Hestia: Holistic Demand Response Services for European Residential Communities
PR: Participatory Design

# 3 Theoretical framework

## 3.1 Overview

This chapter presents the theoretical and conceptual backdrop used to compose Hestia's strategy for participants' recruitment and engagement.

First, a review of theories of social practices is presented, in order to explain householders' energy practices as everyday 'routinized behaviours' (Smale, van Vliet & Spaargaren 2017, p. 132) taking place in the household, which is perceived as a 'hybrid of objects and people' (Naus et al. 2014, p. 438). Theories of practice direct the focus of household energy behaviour away from individual users, towards the understanding of more collective everyday consumption practices (Naus et al. 2014). This perspective is very useful for the study of the interaction between householders and the material elements of their homes (such as technologies and spaces) during the performance of their everyday practices (Hansen 2018). Moreover, theories of practice observe how household practices are combined and form 'bundles' of activities performed in the same space, which makes it very relevant for the study of demand response at home and the flexibility of these inter-related everyday practices.

In addition, principles of participatory design and co-creation are discussed as appropriate conceptual methodologies for composing a framework for the engagement of consumers in the development of Hestia. Rather than ask consumers to simply 'accept' or test a technological application and adjust their behaviour at home accordingly, Hestia aims to involve users as co-designers of the DR platform along the way. Participatory design is an established methodology for involving users in collaborative activities with designers or technical developers, in order to generate meaningful design solutions (Björgvinsson 2008).

The chapter also discusses technical (professional) and amateur experts as part of an 'eco-system of expertise' (Brand & Karvonen 2007, p. 21), acting as complementary forces in the transition to more energy efficient living.

## 3.2 Theories of social practice as theoretical background

### 3.2.1 Understanding DR as a component of everyday household practices

There are different ways to understand energy demand in regard to households. Some of these include the conception of energy demand as an outcome of individual behaviour, energy demand as a result of the advancement of technological infrastructures and appliances, or energy demand as an outcome of socio-technical change (Cass & Shove 2017). Another perspective, the one Hestia adopts, is the understanding of energy demand as an outcome of the 'interwoven social practices' (Walker 2014, p. 49) which our communities consist of. Theories of practice recognise that 'energy is used not for its own sake, but as part of, and in the course of, accomplishing social practices, examples of which might include cooking, commuting to work, watching TV or conducting meetings' (Shove & Walker 2014, p. 42).

Understanding energy demand at home therefore implies an appreciation of the underlying rhythms and dynamics of everyday life at home, which are bound by shared socio-cultural norms and understandings, 'institutional arrangements' as well as infrastructures and technologies (Walker 2014, p. 49). The energy required, for example, for the preparation of an evening meal, is associated with inter-related issues such as the schedules or co-location of members of a household (Southerton 2013), the shared, culturally embedded understandings of what a meal should consist of (Cass & Shove 2017), and the related practices of shopping and organisation of cooking (Warde 2013). In this manner, energy is perceived as a component of the 'doing' of such practices, which is embedded in the fluctuation of everyday life and its seasonal variations (Walker 2014). Furthermore practices, such as having dinner, have variations between different countries and social groups (Cass & Shove 2017), such as these that the Hestia's pilots are adopting.

Established energy-related household practices such as food preparation, home comfort and transport are unlikely to change significantly just by small adjustments or simple incentives, such as, e.g., energy tariffs (Wilhite 2014, p. 26). Instead, adjustments need to be made to the material arrangements of these practices and to the commonly understood ways of performing everyday tasks (Wilhite 2014). Therefore, rather than focus on the performance of technological systems and devices in order to understand how energy demand is made at home, we need to concentrate on the performance of everyday practices with technologies and devices, as co-participants who contribute to the action.

Furthermore, everyday home practices even when performed by individuals, relate to collective rhythms and know-how of social units and groups, such as the household or the neighbourhood. In this case, energy use is not just an individual action but a 'collective' and 'political endeavour' (Skjølsvold, Ryghaug & Berker 2015, p. 5). The concept of habitus, initially introduced by Bourdieu (1984), suggests the sum of people's practices and habits, which are directly attained through their up-bringing and social class (Sunikka-blank, Galvin & Behar 2018). The question in the case of Hestia is how people's habitus, within each pilot, determines the ways in which they perform their everyday energy practices and the ways they perceive the need for energy efficiency and therefore flexibility of their practices. Further to this, the influence of the habitus comes useful as a way to understand the different ways in which learning takes place within social contexts. Learning, of a new practice or of a new element of practice (such as a device) in the context of Hestia can be considered not only as an individual matter but as a collective and participatory experience (Sahakian & Wilhite 2014; Lave & Wenger 1991). Community interaction and experimentation support both individual and social learning. Thus, we should regard energy saving as a continual (or at least prolonged) *learning process* and not as a single incident aimed at making people adopt a new technology or specific behaviour. If energy savings are going to be significant and lasting, it is important to base practice changes on learning processes that ensure that new practices become (embodied) daily routines at the non-reflective level (i.e. naturalized). Otherwise, there will be a high risk of the "fallback effect", i.e. when energy savings wears off again after some time (Hargreaves, Nye & Burgess 2013; Wilhite & Ling 1995). Adopting a social learning perspective, within the wider practice theoretical framework, predetermines a good base understanding of the local consumption culture in each pilot and 'how it is manifested in social practices' (Sahakian & Wilhite 2014, p. 31).

### 3.2.2 How do technologies become meaningful to householders' everyday life?

Living with media and technologies and bringing a new technology in the home implies the need to create bonds and relationships with them as way to 'domesticate' them in the household's everyday life. Theories of domestication, introduced in the 1980s by media scolars (Morley 2006; Silverstone 2006), are concerned with the integration of media and technology in the routines of everyday life (Hartmann 2014). Domestication adopts a user-centred outlook (Godbolt 2015) and considers the 'messiness' and unpredictability of everyday life at home, by realising 'technology's place within its dynamics, rituals, rules and routines' (Juntunen 2014, p. 29).

The process of domestication involves different stages, during which the technology is introduced from the public domain to the private space of home (Courtois & Verdegem 2012, p. 423). These stages are: a) appropriation b) objectification, c) incorporation and d) conversion (Sørensesn 2006, p. 45). Initially the technology, as an object, is appropriated, or introduced in the home environment and given a place. Then, in the objectification stages, the new technological object is given an identity through its use, including an 'aesthetic function within the home' (Aggeli 2021, p. 132). Following on, in the stage of incorporation, the technological object is integrated in the everyday routines of the household. Finally in the conversion stage, the technology obtains a symbolic meaning for its users and becomes familiar for everyday use (Chambers 2016; Silverstone, Hirsch & Morley 1992; Strathern et al. 2003; Berker et al. 2006; Olsson & Viscovi 2018). In order for technologies to be successfully domesticated, households need to make sense of the meanings and dynamics of it in their home, along with their everyday committments and rhythms (Godbolt 2015).

Domestication offers an alternative perspective and framework through which to investigate the sometimes weak longterm committment of households with household energy efficient technologies (Godbolt 2015). It is therefore important to map and understand what kind of domestication processes will be involved in regard to the adoption of the HESTIA platform, and any relevant technological devices, in the pilot homes. For example, one way would be to explore how households negotiate the use of the platform amongst their members, how they interpret the usefulness of the platform in regard to short and longterm everyday living and to what extent the familiarisation of one technology could lead to further adoption of renewable energy technologies at home. In this process of negotiation and domestication of technology, the role of technical or professional and amateur or non-professional users, discussed in the next section, are critical in order to develop an appropriate balance for collaboration and the sharing of expertise.

## 3.3 Ordinary 'amateur' and professional experts

The advancement and prevalence of technology in our societies has come in line with the rise of a variety of technical experts, who hold the knowledge and expertise to 'design, build and maintain these technologies' (Brand & Karvonen 2007, p. 21). Professional, technical experts have enjoyed prominent profiles and status in modern societies (Brand

& Karvonen 2007), and are contributing to visions for low-carbon living in cities and more recently to visions about the future of smart grids (Throndsen 2017). Smart grids are expected to change the way we produce and consume energy and are thought to be contributing to the mitigation of climate change (Skjølsvold, Ryghaug & Berker 2015). Smart grids have the potential to turn householders into prosumers through the ability to produce energy at home and they involve a variety of 'gadgets' and devices that come along, such as renewable energy producing technologies (e.g. rooftop PV panels), smart meters, digital in-home displays and feedback devices (Skjølsvold, Ryghaug & Berker 2015; Christensen, Friis & Skjølsvold 2017).

Expert expectations of users in smart grid projects vary, with a dominant example of the profile of the Resource Man (Strengers 2013). The Resource Man is envisaged as a rational active user who can easily adjust his energy consumption using the gadgets and incentives provided. However, this depiction of the smart grid user often fails to acknowledge or act on other contextual factors of everyday life with an influence on the actual use of smart grid solutions, such as family life and other life obligations (Skjølsvold, Ryghaug & Berker 2015). The profile and expectation of the Resource Man is often contradicted by experts' appreciation that the smart grid is quite complex for an ordinary user to understand (Schick & Winthereik 2013). Studies on experts' expectations of smart grid users suggest that user engagement is essentially a 'problem of publics' and a 'democratic challenge' (Throndsen 2017, p. 295).

Furthermore, the technical understanding of energy, developed from building professionals through means such as measuring electricity consumption in buildings, is considerably different from that of consumers, such as householders (Shove 2000). Therefore, experts' imagined visions of user's understanding and involvement in the smart grid is not what actually happens in real life. A top-down, expert approach to challenging and multi-dimensional issues, such as sustainability and the transition to energy efficient living, often underuses the creativity and appreciation of local wisdom of individual people (Brand & Karvonen 2007). Brand and Karvonen suggest that an 'ecosystem of expertise' is required in order to deal with sustainable development in cities (Brand & Karvonen 2007, p. 29). This ecosystem includes four different kinds of experts: 1) the outrearch expert, who does not consider the impact of the public, non-expert perspectives, 2) the interdisciplinary expert, who blurs the boundaries between disciplines to broaden the discourses between them, 3) the meta-expert, who is able to understand and critically refer to a variety of technical knowledge from different disciplines or 'pick cherries' in order to mix and match appropriate issues, and 4) the civic expert, whose role is to engage and involve citizens in order to enlighten professional, technical knowledge and development (Aggeli 2021; Brand & Karvonen 2007). The last expert type, the civic expert, defines a participatory model of expertise, which is particularly relevant to the development of the HESTIA technologies. Promoting the collaboration and improving the communication of experts and non-experts supplements and expands the construction of scientific knowledge, making it socially powerful and 'accountable' (Brand & Karvonen 2007, p. 28).

Furthermore, the social networks in which householders belong to, such as close friends and relatives are crucial to the adoption and domestication of smart technologies at home. The concept of 'warm expert' (Bakardjieva 2005; Olsson & Viscovi 2018) describes a non-professional but familiar person to the adopter of a technology. Warm experts act as mediators between the user and the technology and assist inexperienced or less experienced users to get more confident and proficient with digital systems and technologies. Warm experts can also act as intermediaries between professional experts and users, therefore enabling the development of new skills with existing and tacit know-how. Warm experts are particularly important when dealing with diverse groups such as elderly users (Olsson & Viscovi 2018), which are also part of the HESTIA pilots. This has been shown to be the case in previous projects; e.g. the RESPOND project, where in particular older participants in a DR trial reported difficulties with installing and using the app developed by the project, and therefore reported getting help to solve technical problems from their neighbours or adult children (Christensen et al. 2020). An interesting point would be to identify who needs warm experts as mediators with the new home technologies and for what processes or devices householders need them for.

The sharing of expertise and the understanding of the expectations of both users and technical experts is therefore an important consideration in regard to engagement, pointing to a need to consider equally both sides: users and experts. An appropriate methodological framework for encouraging and sustaining engagement of all actors to a project is offered by the field of Participatory design and will be discussed in the next section.

## 3.4 Participatory design and co-creation

Along with advances in technological and energy-efficiency innovations, the consumer is considered as the 'single most important concept for understanding, managing and achieving necessary reductions and shifts in energy demand' (Strengers, Nicholls & Maller 2016, p. 762). The engagement of householders, as consumers of energy is currently challenging, particularly as economic incentives alone do not seem to get the anticipated results in recent technological solutions developed (Sahakian & Bertho 2018; Christensen, Friis, et al. 2020). In the past 30 years, there has been a gradual move from the model of passive consumer to one with a more active profile or to the 'citizen consumer' model (Strengers, Nicholls & Maller 2016, p. 763). A citizen consumer in the energy sector is considered an environmentally conscious individual who actively seeks to amend their consumption in order to contribute to 'the common good' (ibid). This rational model of concerned individual lends itself to further categorisations of consumer profiles, such as 'concerned greens', 'traditional' or 'easy street' (SGCC 2012, p. 18), each of which presents specific characteristics used to shape relevant strategies for their engagement in smart grid programmes.

However, how we use energy at home is an accumulation of our social and cultural understandings and know-hows, as well as social norms and conventions that are prevalent in our communities (Wilhite 2014). This commonly held knowledge, termed tacit knowledge or knowledge that sometimes cannot be put into words (Polanyi 1966; Glanville 2018), includes the embodied skills that we hold in order to perform various everyday practices, such as riding a bike or cook a meal (Adloff, Gerund & Kaldewey 2015). Therefore, in order to capture this tacit knowledge of the everyday energy practices, HESTIA will focus on the engagement of households as collective social units rather than individual consumers. An appropriate methodology to engage households, and the communities they belong in, comes from the design-centred traditions of Participatory Design (PD) and its more recent counterparts of co-design and co-creation. The aim of HESTIA is to develop a participatory methodology for householder engagement, which is framed by the theoretical considerations of practice theories, as explained in the previous section.

Since the 1970s, when it was introduced for the empowerment of employees for workplace democracy (Robertson & Simonsen 2012; Agid 2016; Andersen et al. 2015), PD has progressively moved from issues of technology engagement to issues of everyday life and challenges in the public domain (Bjorgvinsson, Ehn & Hillgren 2012; Björgvinsson, Ehn & Hillgren 2010). PD includes a diverse collection of methods and practices for enabling collaboration and support the co-design of 'tools, environments, businesses and social institutions in which technologies are embedded' (Robertson & Simonsen 2012, p. 2).

PD is a complex and dynamic process (Manzini & Rizzo 2011) which adopts different design practices, such as different 'tools and techniques' (including technological devices) in order to construct visions and ideas of the future through 'making, telling and enacting' (Brandt, Binder & E. B. N. Sanders 2012, p. 145). In the case of HESTIA, such participatory processes can assist in the generation of collectively imagined scenarios for household DR, based on the current everyday routines of the participating households. The participants' everyday practices are important components of this process of future vision making, as they act as a means for sharing common ideas and reflections and therefore encouraging mutual and social learning (Brandt, Binder & E. B. N. Sanders 2012; Bratteteig & Wagner 2012). Furthermore, connecting and co-locating the actors of a project gives them 'new insights and new competences' (Bjorgvinsson, Ehn & Hillgren 2012, p. 141). Since we currently experience challenges relating to the co-location of people due to COVID-19, it would be beneficial to have an alternative way of communicating and co-creating in a virtual environment. As Muljono et al (2016) argue, PD methods need to expand further than the 'paper-based collective making' , to include 'virtual spaces, tools and materials' (p2) for interaction of audiences spread globally, and for catering in situations such as the current pandemic.

In addition, by enabling the development of new networks between participants and local or national organisations, there is a potential to sustain these newly developed collaborations into long-term relationships and partnerships (Bjorgvinsson, Ehn & Hillgren 2012). This would make sense for HESTIA, as a way to manifest the results of the project as long-lasting commitments of each pilot community, which can then be generalised to larger population groups. So, even when policies or energy initiatives commonly address citizens as household consumers of closed-off, small scale and even isolated environments (Voss & Carolan 2012), participatory methodologies can bridge together households as units of communities, physical and virtual and therefore as important units in the intersection of private and public domains.

In addition to PD, different processes of co-creation, which refers to any kind of collective activity shared between people (Sanders & Stappers 2008, p. 6), have emerged in energy studies as appropriate ways to engage end-users as active co-creators of innovations (Kotilainen et al. 2019, p. 204). The EU Commission has also identified co-creation as an appropriate method for engaging citizens in developing new tools and enhancing innovation (European Commission 2018). The potential of co-creation is the integration of the perspective and needs of end-users in the solution of the given challenges, as active collaborators during their design (Gjørtler Elkjær, Horst & Nyborg 2021).

Both PD and co-creation share similar methods for capturing people's experience, such as participatory workshops, cultural probes and generative toolkits, which are material objects that facilitate the creation of new visions and concepts through making (Brandt, Binder & E. B. N. Sanders 2012). These methods enable the capturing of the tacit knowledge of everyday life, such as notions of comfort and culturally distinct ways of organising routines. Areas in which co-creation and PD can contribute include future visions of living with smart energy systems and technologies, new business models or services for the community and the further development of new concepts in regard to the digitalization of society (Kotilainen et al. 2019). The specific methods that will be used in Hestia, are outlined in section 4.4.

# 4 HESTIA user recruitment and engagement strategy

Based on the theoretical framework outlined in the previous chapter, we will, in this chapter, develop the user recruitment and engagement strategy of Hestia. However, the chapter begins with some observations on the challenges of the current COVID-19 situation and the bearings of this for the design of strategy.

## 4.1 Overview and COVID-19 challenges

Hestia began in November 2020, during a time when most partners were placed under local or national lockdowns due to COVID-19. The pandemic has brought unprecedented consequences to the research community, in addition to the challenges of everyday life (Fell et al. 2020). Local and national lockdowns have therefore presented a considerable challenge to the access and communication with the pilot sites of Hestia. Furthermore, Hestia's research includes a substantial amount of qualitative research, which broadly is employed to explore the 'whys and the hows of human behaviour, opinion, and experience' (Guest, Namey & Mitchell 2013, p. 2). Doing successful qualitative research suggests that researchers become part of the participants' groups in order to compose the meaning and interpretation of their experience (Holloway & Biley 2011). Since some of the pilot partners are not located in the chosen sites, communication and co-ordination of tasks has been challenged further. Since physical co-presence has been impossible in the early stages of Hestia, different methods for re-creating these experiences are required.

Furthermore, even when access to participants is somehow achieved, the conditions of everyday life do not necessarily represent an average picture of 'normality', since the majority of the population around the world has experienced – and continues to live through – stressful and emotionally distressed everyday conditions (Fell et al. 2020). Under such circumstances, the validity of the collected data is also challenged, and it is important to recognise their effect in the overall progress and knowledge production of a project (ibid). Moreover, in the domain of energy research, the COVID-19 conditions have further implications, since people are spending longer periods of time at home, and many might have also suffered the consequences of a changed employment status, which affects everyday routines and consequently everyday energy practices (Fell et al. 2020). Fell et al. (2020), in their recent paper on COVID-19 challenges for energy research, identify a range of issues across different dimensions of life (such as demographic, behavioural, cognitive, social, material/technical and contextual) which have been significantly affected by the current pandemic, and which researchers must pay particular attention to when designing and conducting their research. For example, they suggest that when investigating household energy use, it is important to assess the difference in the daily routines that has been brought about by the pandemic, at individual and household level, and attempt to compare it with pre-COVID data (Fell et al. 2020, p. 4).

Therefore, the possible challenges that the Hestia researchers might face include:

- Lack of or limited access to potential participants
- Lack of or limited communication pathways (in comparison to pre-Covid-19 conditions)
- Non-typical representation of everyday life at home
- Non-typical representation of household physical and cognitive load between members
- Weaker participation rates of participants or limited sustainment of participants for a longer period of time

### 4.1.1 Mitigation of Covid-19 challenges

Therefore, in order to limit or prevent more extensive negative consequenses of Covid-19 challenges in the research process, we need to pay attention to these identified factors above. While some of these challenges could also be present during a typical research project in pre-Covid-19 times, it is important to focus on how to strengthen the ways in which we recruit and engage participants during the next few moths and for the length of the project.

The current conditions have generated the need for new or revised methods for the overall design of qualitative research and in particular, they have created space for new methods for collecting and evaluating data. One way to mitigate these challenges comes from the field of rapid qualitative research (Vindrola-Padros et al. 2020). While traditional qualitative research is known for its typically long-term processes of data collection and analysis (Vindrola-Padros & Johnson 2020), demanding or challenging conditions, such as time-pressures or pandemics, have resulted in the development of 'rapid' methods of qualitative enquiry, such as focused ethnography (Knoblauch 2005), short-term ethnography (Pink & Morgan 2013), rapid qualitative inquiry (Beebe 2014) amongst others. Rapid qualitative methods involve 'intensive, team-based qualitative inquiry with (a) focus on the insider's [...] perspective,

(b) using iterative data analysis and additional data collection to quickly develop a preliminary understanding of the situation' (Beebe 2014, p. 3). It therefore seems appropriate to employ similar methods of rapid qualitative inquiry for the purposes of both understanding the householders' needs and for getting them engaged in Hestia, through short and intense interactions. These will be discussed in detail under section 4.4. Rapid virtual methods for data collection, such as synchronous and asynchronous sessions with households, can strengthen address the lack of physical, face-tp-face communication, by introducing some of the Hestia activities to participants through digital media platforms. The benefit of this is that we could reach participants who otherwise might not have been able to come out in the community and get involved (for various reason regarding their health or other personal circumstances). By introducing additional short-time virtual interactions we therefore open-up opportunities for wider participation.

Furthermore, since a lot of the early communication with potential participants will take place virtually, it is important to keep a regular line of communication, in close time intervals, so that participants feel the connection between the different activities, rather than leave long periods of time without an input. While we need to be sensitive about not overloading participants with requests for information about their everyday life, it is important to make them feel as critical collaborators in the research process, and try to facilitate a friendly, collaborative research environment for interaction. The pilot partners will play an essential intermediary role in this process, making sure that participants understand that the research is voluntary, that they have a familiar (and local) representative that they can address questions or comments to, and that they can also opt out of the process at any point.

Finally, it is important to maintain a flexibility in the planning process of recruitment and engagement activities and to be in continuous communication with the pilot partners in order to be able to trace the conditions of each pilot and to react accordingly. Giving adequate space and time for pilot partners to co-ordinate activities should be a priority as well as keep in close communication with the actors involved in each engagement.

## 4.2 Participant recruitment process

The following sections outlines the recruitment process of Hestia, expanding on some considerations for a more inclusive, appropriate and relevant methods for identifying participants for the project.

### 4.2.1 Criteria and considerations for participant recruitment

Hestia will recruit households from three already determined pilot sites, spread in three different European countries. Two out of the three communities present similar socio-economic characteristics and household typologies, including a high representation of middle-to-high income professional individuals living in semi-detached or detached homes. The third pilot presents a greater diversity with a larger representation of older residents and a greater variety of household types. Despite the rather increased homogeneity of the sample, Hestia will seek to recruit and represent a diverse range of profiles and opinions as much as possible.

So, in order to achieve diversity to the most possible extent, we need to ensure that a variety of different groups of people are represented in the sample. In specific, we aim to adopt the following criteria:

- **Age**: Seek to engage different age-groups, as far as possible, including younger and older people
- **Gender**: Aim for balance of gender representation amongst the participants in each interaction. Acknowledge the proportion of male-female in the analysis of the findings
- **Household type**: Seek to include different kinds of households (single households, households with families etc.), as much as it is possible, in order to represent a broad spectrum of household practices
- **Ethnicity** and **cultural background**: Seek to include a diverse cohort of participants from different ethnic or cultural backgrounds to the extent available in each site. It is important to acknowledge the ethnic and cultural heritage of participants and strive to develop recruitment activities and materials that are inclusive for all groups. For example pay attention to the choice of communication channels of HESTIA, as well as the ways the project is represented to all participant groups
- **Educational background:** Diversity will be sought to the most possible extent to include participants from a variety of educational backgrounds

### 4.2.2 Storytelling

From the onset of Hestia, it has become evident that the three selected pilots present unique socio-cultural characteristics, which call for customised ways of recruiting and engaging participants. One way of approaching and engaging different social groups is through storytelling, i.e composing appropriate narratives for people to understand and embrace a specific message such as energy efficiency.

Stories and storytelling are deep-rooted cultural practices across the world, associated with emotion (Lugmayr et al. 2017) and personal interpretations of a situation. Stories are used to 'communicate with, influence, and engage audiences; they serve as artefacts to be investigated in terms of content, actors, relationships, power, and structure; they can be used to gather information, provide insight, and reframe evidence in ways that more science-[...] formats miss' (Moezzi, Janda & Rotmann 2017, p. 1). For de Certeau, storytelling provides of means of constructing everyday life (Woodlands 2015, p. 37).

Recently, storytelling has been used in energy and climate change research (for example (Moezzi, Janda & Rotmann 2017; Rotmann, Mourik & Goodchild 2013; Lugmayr et al. 2017; Moezzi 2015; Janda & Topouzi 2015). Hulse and Milne suggest that focusing on storytelling can be more effective in the adoption of energy efficiency than financial and technical information (Hulse & Milne 2019). Janda and Topouzi, discussing energy policy and storytelling, identify two types of stories: the hero story and the learning story. In a short overview, the hero story usually starts and finishes in the 'real' world, however, its narrative, which comes in stages, occurs in a 'special' or imaginary world (Janda & Topouzi 2015, p. 518). In energy hero stories, technology or 'the imaginary world of technical potential' are central, moving the focus away from people and providing a solution through the 'magic elixir' of technology (Janda & Topouzi 2015, p. 519). On the other hand, learning stories focus on the pursuit of meaning and occur in 'authentic cultural locations' (Janda & Topouzi 2015, p. 520). They contain the diversity of everyday settings, centred around real people and their challenges, rather than 'heroes' or 'experts'. Learning energy stories, usually are not resolved by the 'magic elixir' of technology, but present a middle ground between the 'technical potential and what is achieved in practice' (Janda & Topouzi 2015, p. 520).

Both kind of stories are useful to researchers; hero stories enable a better understanding of the actors and their motivations, whereas learning stories assist in accommodating the unexpected. In most cases, the two stories intersect and are contained within each other (Janda & Topouzi 2015). It is up to the researcher to interpret and compose a narrative from the kind of data they receive in order to accurately represent the field, even when the hero story does not emerge as the primary scene. Hestia can benefit from developing learning stories and narratives along the whole length of the project for different purposes. These include for example a way to introduce people to Hestia, to help them embrace our objectives, to help with emerging challenges during the project, and to assist eventually in the ownership of the vision that will be developed through the research with the active participation of citizens.

### 4.2.3 Stages of recruitment

There are different components in Hestia's recruitment process, appropriate for each stage of the project. The overall recruitment will involve both the wider communities in which the pilot sites are set in, as well as more targeted (and limited numbers) of participants for focused, in-depth interactions and household interventions.

The recruitment process of Hestia involves the following stages along the project timeline:

1. **Initial approach of community representatives and municipalities** involved through the Hestia pilot partners (Month 1-5)

This initial step is important for the introduction of the project to the potential participants and for establishing trust between the researchers and the community representatives. Different pilots have specific socio-cultural characteristics and therefore require a customised approach for the way that they introduce Hestia to potential participants. Appropriate construction of a vision and narratives for communicating with each pilot social groups is important at this stage. Online media platforms could be used in order to disseminate these visions to potential

participants in collaboration with local municipalities or other mediating actors. Furthermore, the association of Hestia with other local or EU initiatives or relevant projects will ensure the householders' understanding that Hestia is not a commercial, for-profit project. Some initial approaches to local residents would be to send out a letter of introduction, embraced by their municipality and/or making an introductory posting to local social media groups. The local representatives and municipalities will also make sure that Hestia's communications are translated appropriately and in a culturally significant way to each pilot audience.

2. **Recruitment of households** for participation in an online **survey** (Month 5-6)

The aim of the online survey is to collect general information about the residents and households at the three sites in order to develop a basic understanding of who is living there and create an overall insight into the everyday routines and practices of the households. The recruitment for the survey will take place in collaboration with the pilot partners, who will determine the most appropriate way to reach households (e.g through an online platform or directly through emails and calls). The recruitment for the survey will target a larger number of households at each pilot site, in order to generate a better picture of the average everyday living practices of households. Participants recruited for the survey do not necessarily need to take part in all of the Hestia interactions, however, it would be beneficial if there was continuation of the participation of a small number of households. The survey, which will be disseminated online, could also use a snowballing recruitment, which means that householders who have completed it can refer others (friends, relatives or neighbours) to take part.

3. **Recruitment of a limited number of households** from each pilot (about 5) for participation to **short-virtual interactions** (Month 5-12)

When households complete the survey, a section will ask them if they are interested in taking part in further interactions. This will allow us to build a cohort of households that could be used for more in-depth interactions. Furthermore, through the identified community representatives and/or municipalities, pilot partners will assist in the identification of a small number of households who would be willing to participate in short, virtual, in-depth conversations about their everyday energy practices. Recruitment for this task can be assisted by online media platforms (such as announcements on social media and the Hestia website). Informed consents will be provided to participants in which they can understand the use of their personal data.

4. **Recruitment of households** for participation in the **workshops and household interventions** (Month 10-12)

The recruitment process for the participatory workshops is really important, in order to achieve a good balance of experts and 'ordinary' people and for them to be kept at a manageable size for facilitation. Depending on COVID-19 restrictions at the time of the workshops, we might need to take special precautions, such as running them outdoors or conducting them virtually if physical contact is not appropriate. Recruitment for the workshop would be more efficient if some participants have already been part of previous Hestia interactions, such as the survey and the virtual interactions. However, participation will not be limited to these and can include other households from each pilot. The number of participants and the objectives to be achieved will be defined in more detail closer to the time of the workshop, when conditions are better known. Engagement and recruitment of a variety of household profiles should be targeted in order to represent the different household typologies present at each site, such as single households and families. Balance of genders and ages should also be considered in the recruitment and analysis of results.

In regard to household interventions, recruitment will can be initiated through the already identified households which have taken place in previous interactions and through advertising on local communication networks, such as community social media sites. A thorough and comprehensible information and consent form should be provided for all participants, as well as an opportunity to be in contact with a local representative who can address questions and issues arising.

5. **Recruitment of pilot 'ambassadors'** who will become the 'face of Hestia' and get involved in public events and conferences

During the course of the project, Hestia aims to identify individuals or households who would be happy to become local pilot ambassadors. Pilot ambassadors would be representatives of the community, who can raise awareness

for the work of Hestia, regarding DR, but also assist in the spread of real life examples of energy efficiency practices at home and in the community. Each of the pilots aspire to become good examples of energy communities, and the role of ambassadors would be beneficial as a representation of the different socio-economic and cultural groups in each community in order to assist the public outreach and share good practice with other communities nationally and internationally.

## 4.3 User engagement methodology outline

### 4.3.1 Overview of engagement principles

Hestia will use participatory methods to involve householders in the design of the ICT platform for DR from the early stages. Hestia needs to recruit and maintain some of its participants throughout the length of the project in order to develop good in-depth understandings of the energy practices of households. It is thus crucial to encourage and support a small but dedicated cohort of households from each site, which will provide continuous and relevant input to the planned Hestia activities, but also generate data through the Hestia home toolkits and their everyday living at home.

Furthermore, as suggested from previous projects, communication with the project participants needs to be as continuous as possible in order to ensure more successful engagement (S3C 2013).

In specific, Hestia will seek to:

- Understand and respond to the needs and everyday practices of households and their communities in the pilot sites
- Encourage meaningful consultation and participation of householders along the different stages of the Hestia DR platform
- Encourage and support continuous communication with householders to the extent possible
- Promote and develop ICT solutions to respond to diverse households (considering issues of gender, age and socio-cultural background)
- Respect local decision-making processes and norms and design interactions accordingly
- Provide timely and up to date information about events or activities planned that require household input
- Seek to involve diverse groups of householders in the decision-making processes of Hestia as much as possible at each stage of the project
- Ensure good facilitation of participatory events (physical and virtual) and absorb the feedback received in these sessions in the development of deliverables
- Maintain transparency of the procedures and data collected and comply with all relevant GDPR regulations of each pilot and the overall EU rules
- Make efforts to use the local language of each pilot is all interactions, unless the conditions and approval from participants allow for use of English for communication

### 4.3.2 Pilot specific engagement

As mentioned previously , it is important for the Hestia researchers to be in close communication and dialogue with the pilot partners and the rest of the actors involved in each recruitment and engagement activity. It is also important to pay attention in the period between recruitmnent and engagement, such as for example, in the periods between the different activities such as the survey and the short virtual interactions. It would be critical to retain a small but adequate amount of households in the transition between the larger cohort of the household survey and the smaller virtual interactions and workshops. It is therefore important to work closely with each pilot in order to achieve the appropriate communication and logistics of running each activity. The section below outlines some of the particular requirement that might be relevant in each pilot.

#### 4.3.2.1 Berchidda- the Italian pilot

Berchidda is characterised by a greater diversity of demographics, house typologies and energy systems compared to the other two pilots. It is also the oldest established community. Because of this, it is important to use the community coherence and established trust with local actors, such as the mayor and the municipality in general, in order to support our recruitment and participation.

In terms of communication, it is important to use local and familiar people to spread the message for Hestia, appropriately integrated for local relevance and context. Local digital networks, such as social media platforms can be used as an addition or instead of physical presence. Videos, recorded messages and customised publications in local platforms can help with the initial recruitment and the further identification of smaller numbers of households for the virtual interactions. Due to the larger representation of older citizens, it might also be appropriate to use telephone conversations in order to notify and remind them of the project and for keeping in touch in the process. The household survey will have a section in which interested participants can log in their details (name, email and/or phone number) in order to be contacted for further activities.

In terms of logistics of running the recruitment and engagement, it would be preferable that local trusted actors became the initial ambassadors for organising events or for co-ordinating information to the public. The household survey will be disseminated through local digital media channels, such as existing social media groups that the residents visit regularly, or, if considered appropriate, be sent out as printed documents to citizens who don't have a digital presence. Local pilot partners will also be responsible for reminding organised activities to participants, either by publishing in local social media groups or by calling people.

When the time comes for the running of workshops, we will make sure that all local and European safety measures are observed. If deemed appropriate face to face workshops can take place outside or in semi-covered and well-aired spaces keeping all the rest of the requirement for spatial distancing, personal protection and accessibility for all. Local pilot partners will co-ordinate the facilitiation of the workshops, in close collaboration with the other relevant researchers of Hestia.

#### 4.3.2.2 Camille Claudel- the French pilot

The French pilot contains both privately owned homes as well as social housing. It is therefore important that there is representation from both these sections of the pilot. We will identify relevant local presentatives from both private and public homes, and seek relevant digital and physical platforms for direct communication with the citizens.

The communication and facilitation procedures will be similar to the Italian pilot. The researchers involved in each planned activity will be in close contact with the pilot partners in order to co-ordinate and facilitate each event. The Camille Claudel is already an eco-district so citizens might be more aware and active with renewable energy schemes, however, it is important not to take for granted this 'knowledge' and try to understand their experience of their energy system in everyday life. Finally, the interactions would be targeted around the existing heating schemes of wood and gas, but also expand to understand how to engage citizens in the development of future solar energy initiatives.

#### 4.3.2.3 Voorhoot district- the Dutch pilot

The Voorhoot district is a fairly new community in the Netherlands. Since the resident have had some technical issues with the smart devices that were installed in their homes, it is important to begin their introduction of Hestia after the repairs have taken place. It is important to develop trust with the potential participants, through the pilot partners, but also to make the objectives and benefits of Hestia, including the specifics of their involvement clear. The first step therefore for the Dutch pilot site would be to initiate an information event or publication, which clearly communicate Hestia's aim for involving citizens as co-creators of DR interfaces and the steps that this will involve. Also, it is important that people understand the technology is the medium through which issues of energy efficiency and everyday life are tackled, rather than the sole purpose of the study.

Furthermore, the pilot partners will make use of the existing community representatives, potentially transforming them into local ambassadors in order to assist the processes of recruitment and participation to all the activities planned. Regular meetings, physical or virtual, are important in order to facilitate continuous communication with the ambassadors and in order to better understand the specific requirements of the community.

### 4.3.3 Level of participation

As discussed in Chapter 3, PD methods will be used to engage householders in the design of the Hestia platform. Engaging citizens in energy matters, and considering them as 'energy citizens' or 'co-providers of energy' (Owens & Driffill 2008, p. 4415) , is perceived as a determining factor for the future of energy initiatives, allowing for issues such as transparency and a socially-responsible decision-making process to take place (Ambrose 2020). However,

the extent to which householders can and will participate will not always uniform across all stages of Hestia and will be determined by several factors. These include the kind of technology developed, contextual factors to do with ability to co-locate physically or virtually with stakeholders, as well as their willingness and availability and other factors which will be made clearer once the technical development of the platform kicks off.

Hestia aims to build on existing models for participation, such as the Arnstein's ladder of participation (Arnstein 1969) (see Figure 1), which outlines several layers of citizen involvement, ranging from non-participation to full citizen control. Arnstein's model reviews the level of engagement on behalf of the receivers of a service or issue (i.e. the citizens), however other models, such as Jules Pretty's (1995) adopts the perspective of those who design participation (Cornwall 2008). Both models describe a progressive move from a passive model of citizen engagement (or non-engagement) led by authorities, to more citizen-driven forms of action led by 'ordinary' people (ibid).

| | |
|---|---|
| CITIZEN CONTROL<br>DELEGATED POWER<br>PARTNERSHIP | Citizen Power |
| CONSULTATION<br>INFORMING<br>PLACATION | Tokenism |
| THERAPY<br>MANIPULATION | Non Participation |

*Fig. 1 Arnstein's Ladder of participation. Re-drawn by authors from* (Cornwall 2008)

The issue of participation in participatory projects is a 'matter of concern' (Andersen et al. 2015, p. 250), since the details of what participation of users contains are loosely defined in research projects (Halskov & Hansen 2015). The involvement of householders, as users of the Hestia interface, during the design and testing of the platform, can range between information and consultations sessions, to collaborative events (such as the workshops), which can potentially move the level of participation from the more passive (left side of Table 1), toward a more active and empowering control of the system (right side of Table 1).

Level of involvement and impact of consumer engagement in the decision making of a project

| Inform | Consult | Collaborate | Consent | Empower |
|---|---|---|---|---|
| Provide objective information to stakeholders in order to allow them to understand the issue under investigation, the challenges and possible opportunities for resolving it | Get feedback from stakeholders on the analysis of the tasks performed by researchers and consider their ideas/concerns | Create a partnership with stakeholders in order to discuss and resolve all possible decisions and allow for their input to the maximum extent possible | Respect the decisions of stakeholders in regards to the level of involvement they have chosen in the progress of certain tasks or the overall project | Assign control of the decision making activities to stakeholders |

*Table 1: Levels of participation in a project. Adapted by authors from : (UNDP 2020, p. 7)*

The Hestia cohort would benefit from a long-term engagement of participants and the recruitment of Hestia 'ambassadors', who can embrace the objectives of the project and scale it up to larger and wider audiences. There has been criticisms of previous initiatives, which despite engaging citizens in the process of design, they have not made them part of the long-term planning and decision making (Ambrose 2020). It would be therefore beneficial

that Hestia enables the recruited participants to get involved further than the duration of the project and maintain their role as a leading example beyond the completion of Hestia. In order to do so, it is important to allow for the merging of technical expertise (provided by the technical and scientific partners of Hestia) with 'ordinary' experience of everyday life at home. Facilitating and assisting a continuous dialogue between the two sides can merge their perspective and allow for the development of a more inclusive understanding of energy communities (Ambrose 2020).

### 4.3.4 Stages of participants' engagement

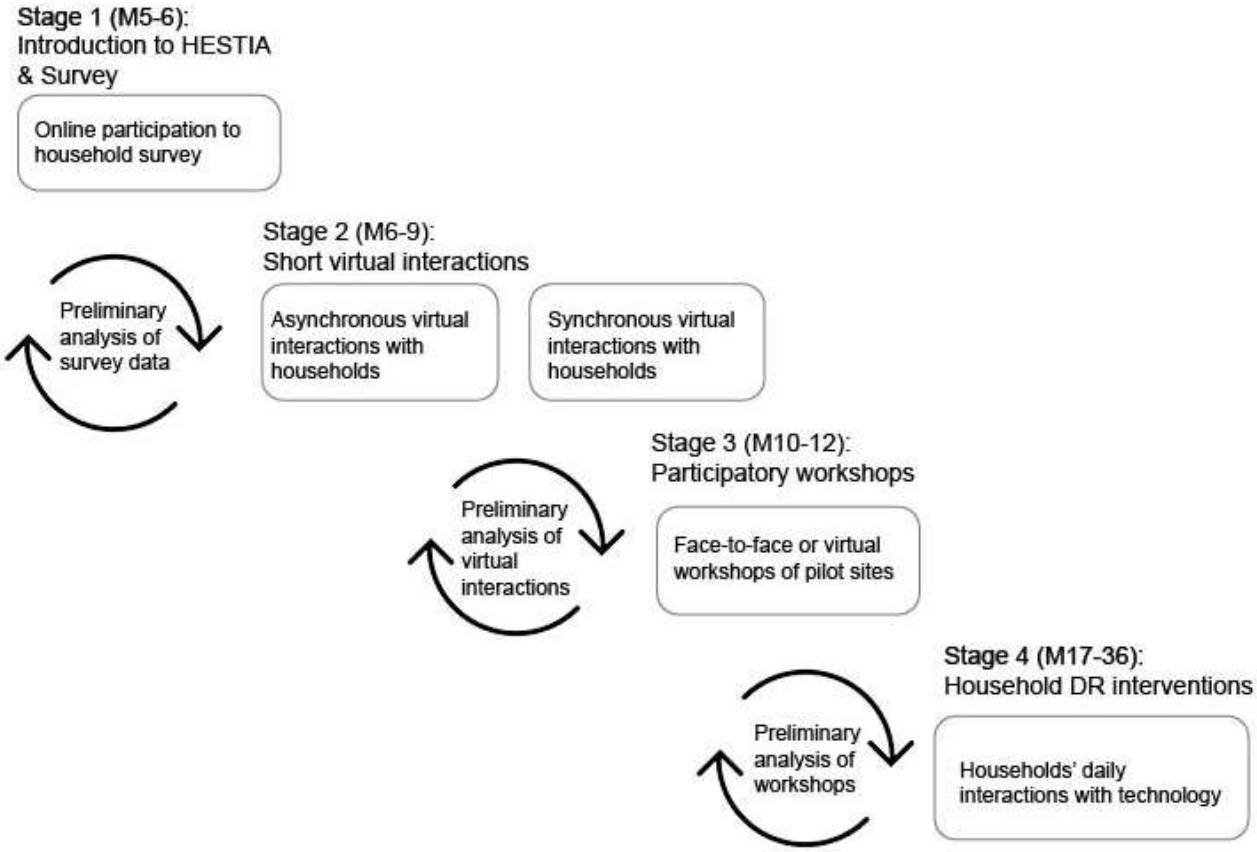


*Fig. 2 Stages of participants' engagement during the HESTIA project timeline*

## 4.4 Data collection methods

The following section outlines the different methods that Hestia will adopt in order to collect data and in-depth insights from the participating households. The methods outlined are indicative of the intentions in the beginning of the project; however, as we move along, there might be additions or alterations to these as appropriate.

### 4.4.1 Survey

The household survey is the first data collection method for Hestia. The survey, which is formally part of WP1 (T1.2), aims to generate a first understanding of how people create energy demand at home through their everyday routines. The survey will contribute to the development of Hestia in two way. First, by creating a profile of the local households it will inform the strategic approach to the recruitment of households for the later activities in WP2 and the final pilot trial (e.g., ensure a sufficient diversity of local residents regarding socio-economic variables). Second, the survey results on the profile of the households and their patterns of everyday routines will qualify the content of the later short-virtual interactions and workshops with residents from the sites.

The survey will be designed in collaboration with the pilot partners and in response to their specific socio-cultural and practical considerations. Since the survey is the first point of interaction with Hestia, it is important that we

maintain a balance between keeping participants interested – and not over exhausted for information – and simultaneously collecting adequate and important data for the project. Furthermore, it would be preferable to keep the language of the survey simple, without technical or other jargon that could comfuse participants, and to make the narrative of the document easy to navigate. An introduction to the survey, explaining its purpose, ethical and privacy considerations and a statement about the benefit of the project to participants, might help generate a positive feeling amongst potential participants and encourage a more sustained participation for further Hestia interactions.

The survey will engage a larger number of participants compared to the following, more focused interactions with households. It will be designed in a format for easy dissemination, for example as an online document. The content will be structured in different parts, thematised appropriately in order to map what householders do at home with energy, how they do it and what is their understanding and everyday use of smart energy systems at home.

### 4.4.2 Short virtual synchronous interactions

Following the household survey, a small number of households will be recruited from each pilot (5-10), in order to create small groups for more in-depth interactions. These interactions are considered as rapid forms of qualitative enquiry, as explained in section 4.1, which will be used as alternatives to face-to-face in-depth interactions with participants.

The short virtual interactions will serve the purpose of expanding on some elements of the survey that are too complex to be answered within a short questionnaire. The virtual synchronous interactions will be designed to tackle one element at each session, for example discuss the ways in which everyday energy practices are co-ordinated and negotiated in a household within a day, as well as throughout longer periods of time. Other themes include (but not exlusively): gender issues regarding housekeeping and digital housekeeping, flexibility of everyday energy practices and routines and engagement with technology (including smart energy systems) in the household. The number and frequency of these synchronous interactions will be determined according to the available participants from each pilot and follow advice from the pilot partners. The aim is that these interactions bridge the timeframe between the survey (month 5) and the participatory workshops (months 10-12).

The interactions will be set as short online sessions through an appropriate platform for each pilot. They will be run in the local language and will be facilitated by the pilot partners, assisted by other Hestia researchers (AAU and DW). The will be semi-structured, which suggests that an outline will be provided for the householders prior to the meetings, including the theme of the conversation and possible questions that might take place. However, they should be flexible enough to accommodate the flow of conversation according to the needs of each participating household and pilot. Visual digiral tools could be used as guidance and mediation between researchers and participants. These can include images and icons that represent everyday household practices, emotions, time and space characterisations. Sessions should be kept short, in the range of 30 to 45 minutes, and be arranged at locally acceptable times of the day and week to suit the diversity of the participants. Pilot partners to advise on appropriate facilitation and communication suitable for each site.

### 4.4.3 Short virtual asynchronous interactions

Short virtual asynchronous interactions will involve short interactions with a small number of identified housholds from each pilot (as in point 4.4.2 above), but in the form of some prepared material that households can engage with. For example, the researchers might ask participants to write a short narrative of their day, focusing on the performance of specific practices, such as preparing a meal or washing routines. The format of this information will be digital and appropriate to digital literacy of each identified household. Pilot partners will assist in the implementation of the task. Short virtual asynchronous intractions are a good tool for allowing participants time and space for reflection for the issue in question. Response to the task can include the provision of visual material on behalf of participants (such as photos, sketches, diagrams etc.) in order to help explain their perpsective. The asynchronous interactions can be used in combination with the synchronous interactions, either as a step before or after them. They can help generate more in-depth understanding of the householders' experience of energy at home and also generate a useful volume of rich visual material.

### 4.4.4 Participatory workshops

Participatory workshops, sometimes called design charettes, are collaborative processes which involve the contribution of the different stakeholders of project in the designing and decision-making process (Roggema 2014; Howard & Somerville 2014). Workshops are excellent methods for designing with people, rather than designing for people (Muljono, Mckenzie & Elizabeth B.-N. Sanders 2016; Sanders & Stappers 2014), and provide the space and time for the development of a collaborative vision of the issue under investigation. Workshops have the potential to bring communities together, to both appreciate their current practices and also envision and imagine new ways of doing things in the future (Brandt, Binder & E. B.-N. Sanders 2012).

Hestia will run pilot workshops in order to develop visions and scenarios for household DR practices, based on the current everyday practice of the participating households and in order to implement co-design processes for the development of the digital platform. Issues and processes that can be undertaken through the participatory workshops include different ways of brainstorming ideas for DR, the development of a common vision for the local energy community, developing prototypes for a DR interface and encouraging the development of an active energy community of pratice.The workshops will involve researchers and local citizens and are planned to run in the pilot sites between months 10 and 12. Because of the current pandemic, it is uncertain at this stage of the project whether there will a chance of running face-to-face workshops. However, alternative virtual workshops can take place in the event of COVID-19 restrictions.

The atmosphere of the workshop, should be kept informal and the facilitators need to make sure that participants feel comfortable, safe and happy to share their experiences with others, whether the interactions take place in face-to-face or virtual environments. Bringing together different actors in collaborative activities can be challenging (Brandt, Binder & E. B.-N. Sanders 2012). One way to make things easier and to bring closer different groups of people that might otherwise have never mixed, is through the use of boundary objects (Brandt, Binder & E. B.-N. Sanders 2012). Boundary objects can be defined as commonly recognisable elements, such as objects, artefacts, processes (Spurling, Nicola; Blue 2014), which can 'connect multiple social worlds' (Tim et al. 2017). Boundary objects can include commonly shared technological interfaces or devices, which can help facilitate interaction between different groups of people (ibid).

Pilot workshops will run over one or two days each, the format and length of each will be determined closer to the time of running. Following an iterative method of inquiry, preliminary findings and feedback received from the previous interactions, such as the survey and the short virtual (synchronous and asynchronous) interactions can be used to generate a base upon which the workshop theme is developed.

### 4.4.5 Interviews and/or focus groups

Interviews, individually with each household or focus groups combining different households, will be used as ways to get a more in-depth understanding of the householders' DR experiences during Hestia. Semi-structured qualitative interviews provide a good tool for developing insights on people's meanings and experiences, while allowing them to expand and further explain their perspective (Collingridge & Gantt 2008). It would be beneficial if the interviews took place at each individual home, where people can have the opportunity to contextualise their experiences and for the researchers to get a visual and sensory appreciation of their practice. Following COVID-19 restrictions, Hestia will aim to incorporate a safe environment for conducting interviews.

## 4.5 The role of communities

One of the goals of Hestia is to create a community engagement methodology. Thus, the solutions developed in Hestia are not only targeting the individual residents or the individual households, but they are also intended to tap into the supporting dynamics of communities. More specifically, the three pilot sites are seen as three different communities, though with different sizes and characters. For instance, the Dutch pilot site represents a relatively small community (measured by the number of households) with people who have moved in more or less at the same time and having a similar socio-economic profile, whereas the Italian site represents a considerable larger community (an entire town) with a much more mixed population measured by socio-economics and demographics. In this way, the three sites represent rather different types of communities and community building around DR initiatives need to take this into account.

Over the years, several studies within the smart energy and smart grid field have explored the role of communities for people's engagement in DR and energy-saving initiatives. Despite this, the community perspective is still an under-developed research field with smart energy and smart grid studies.

Burchell et al. (2016) investigated what role community-oriented action and communication can play in energy campaigns. They found that community-oriented action and communication can prolong the users' engagement with energy feedback information (provided via monitors and weekly e-mails with recommendations). This was due to the users getting a feeling of "being part" of something that extends the boundaries of their individual home and family. Burchell et al. therefore argue that policies and initiatives should create narratives of community action, rather than narratives based on the "smart home utopia" that typically addresses the consumer as a rational and utility-maximising individual (i.e. the Resource Man). Burchell et al. (2016) therefore recommend that feedback on energy consumption should be given as feedback *plus* communication. If communication is channelled out through a trusted organisation in the local community, this can increase engagement with feedback and make it more durable. This communication should furthermore focus on how to take actions, including context-tailored tips and advices on how to reduce or shift energy consumption. In relation to communication, it is furthermore important that this is provided on a regular and ongoing basis.

The community approach also relates to the previous observations with regard to the role of personal networks and "warm experts". Thus, a study by Catney et al. (2013) found that building upon community knowledge networks can promote energy actions among residents. This approach recognises that knowledge and competences are context-dependent and situated, and that one must understand the practices they are embedded within. According to Catney et al., users already possess different forms of knowledge about everyday life and energy practices. If new knowledge then has to be provided to the users and made meaningful and useful to them, it has to build on the existing network. Some communities are better than others to tackle challenges of energy consumption due to their economic, organizational and social capital. Community Knowledge Network (CKN) approaches are specifically occupied with notions of knowledge. Catney et al. define a CKN as "The constellation of people, organizations, material objects, information, practices and relations through which knowledge is shared and articulated within communities and between their members" (p. 510).

The above studies show that it is important to involve local key actors, such as trusted local stakeholders or people who can act as "warm experts" to other residents, in the design of the specific user engagement and recruitment approach at the local sites. In Hestia, we are already working on identifying and establishing contact to such important figures for the local communities at the three sites.

Drawing on the results of Breukers et al. (2009), but translating these to a community-action context, Valkering et al. (2013) identify four different tools of importance when aiming at engaging communities in energy behaviour actions. These are:

- Peer-to-peer communications: E.g. through advice networks or local events.
- Social support and social pressure: E.g. role models in the community.
- Make sure everyone 'does their bit': This relates to a feeling of reciprocity – i.e. knowing that your own actions are not useless because other people are also contributing through their actions.
- Engage stakeholders: I.e. engaging relevant stakeholders such as service providers or retailers.

Recommendations such as these will inform the work in Hestia on designing community-oriented solutions and strategies for engaging residents at the three pilot sites in the coming DR actions.

### 4.6 The importance of gender roles in digital and manual housekeeping of participating households

Everyday homemaking and housekeeping have an effect on energy infrastructures and are therefore important in the transition to more energy efficient systems of energy provision and consumption (Johnson 2020). Everyday homemaking is considered as a highly gendered domain of life, with women currently taking an uneven load in household chores (Mechlenborg & Gram-Hanssen 2020). Therefore, the close study and understanding of everyday energy home practices and routines determines a good understanding of the gender relations and dynamics at home. Further to the practical undertaking of household labour, such as cooking and cleaning, householders undertake 'cognitive labour' (Daminger 2019, p. 610), a term which implies the mental housekeeping such as making decisions, foresee needs of the household and planning the everyday logistics. Cognitive labour is ever-present in households, however it has received less research attention, which makes it difficult to untangle from reports of

physical housekeeping (Daminger 2019). However, cognitive labour, particularly in terms of management of household activities and daily routines is particularly important in the study of DR practices, especially in regard to flexibility of energy practices. If cognitive labour is gendered, in the same way as physical housekeeping, it disproportionately affects women, who are then asked to carry extra load in the undertaking of another physical and cognitive activity (managing DR flexibility).

The implications for Hestia are that if new or additional energy technologies are introduced in the home, we need to pay attention to the internal roles and responsibilities that happen in the household, understanding for example if the digital or technological housekeeping is undertaken by the same person that performs the everyday general housekeeping (Mechlenborg & Gram-Hanssen 2020). Digital housekeeping is a term which defines the different skills required for the running and maintenance of media and technology systems at home (Kennedy et al. 2015). Research suggests that there is an unequal female representation in digital housekeeping routines, which are mostly performed by men, compared to the general housekeeping of a home, which is still perceived as more female dominated (Kennedy et al. 2015). The general housekeeping and related energy-practices, such as doing the laundry, have a direct impact in processes of domestication of technology (Kennedy et al. 2015), as described in chapter 3, since they are related to the overall rhythms and regular routines of a household. The uneven representation of women in digital housekeeping also resonates with Strenger's characterisation of the smart grid consumer as that of the 'Resource man' (Strengers 2013, p. 34–35; Strengers, Nicholls & Maller 2016, p. 764). The Resource man is perceived as the ideal rational user of smart technology, who despite his technical skills he lacks the practical, 'lived experience' of daily life at home (Strengers 2013, p. 9). In response to this model, Johnson (2020) has developed the concept of the 'Flexibility woman' (Johnson 2020, p. 6), who has a good apprehension of her family's schedules and routines and the associated energy loads required to perform them. This model corresponds to the bridging between the physical housekeeping and the cognitive labour, both of which are required for the running of home. While it is best to avoid stereotypical characterisations to develop clear insights, it is important to keep in mind these two extreme positions and make an effort to address the issues surrounding them.

Finally, it is important investigate gender roles and cognitive household labour in the current conditions of the pandemic, in which the boundaries between work and home are blurring. In a recent study of family life during the lockdown in Germany, it was identified that cognitive labour is highly gendered, with concerns about the current conditions disproportionally affecting women (Czymara et al. 2021). Furthermore, the prospect of working from home, for both genders, has brought about more emotional exhaustion, particularly with the added load of children and other familiy responsibilities (Bhumika 2020). All this create extra tensions in the everyday life at home, which then has an impact on the way that householders prioritse and perform energy-related practices. Therefore we need to pay particular attention not only in the gendered roles and distribution of the two types of household labour, but observe them within the current conditions which are challenging 'normality' and possibly breaking or making new bundles of everyday practices at home.

## 4.7 Ethics and privacy

The methods of the Hestia participatory design and user engagement strategy will involve interactions with residents at the three pilot sites, including collecting information about their background, opinions and everyday routines. For this reason, it is important to consider issues of research ethics and privacy carefully. This will be done through developing an informed consent form that complies with national regulations on data privacy at the three pilot sites and communicates the conditions for participation in a clear and simple language to the participants. This communication includes stating the rights of the participants to withdraw from the project at any time they want, including their right to get the personal data collected about them through their participation in Hestia deleted. The informed consents will be developed in close collaboration between AAU, the pilot site partners, Sinloc and other relevant partners in Hestia.

In the treatment and analysis of the collected data, extensive care will be taken to ensure that data are stored and treated on authorised platforms (with sufficient data security) and participants will be anonymized in all communications about the empirical results (unless other, separate agreements have been made with individual participants).

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